

What is claimed is:

1. A carbon monolith comprising a robust carbon monolith characterized by a skeleton size of at least 100 nm, and a hierarchical pore structure having macropores and mesopores.
2. A carbon monolith in accordance with claim 1 wherein said carbon monolith is characterized by a skeleton size of 100 nm to 20 μm .
3. A carbon monolith in accordance with claim 2 wherein said carbon monolith is characterized by a skeleton size of 200 nm to 10 μm .
4. A carbon monolith in accordance with claim 3 wherein said carbon monolith is characterized by a skeleton size of 400 nm to 1 μm .
5. A carbon monolith in accordance with claim 1 wherein said macropores are of a size range of 0.05 μm to 100 μm .
6. A carbon monolith in accordance with claim 5 wherein said macropores are of a size range of 0.1 μm to 50 μm .
7. A carbon monolith in accordance with claim 6 wherein said macropores are of a size range of 0.8 μm to 10 μm .
8. A carbon monolith in accordance with claim 1 wherein said mesopores are of a size range of 18 \AA to 50 nm.
9. A carbon monolith in accordance with claim 8 wherein said mesopores are of a size range of 0.5 nm to 40 nm.
10. A carbon monolith in accordance with claim 9 wherein said mesopores are of a size range of 5 nm to 30 nm.

11. A carbon monolith in accordance with claim 1 wherein said carbon monolith further comprises graphite.
12. A monolithic chromatography column comprising a robust monolithic carbon stationary phase disposed in a chromatography column, said monolithic carbon stationary phase characterized by a skeleton size of at least 100 nm.
13. A monolithic chromatography column in accordance with claim 12 wherein said robust monolithic carbon stationary phase is characterized by a skeleton size of 100 nm to 20 μm .
14. A monolithic chromatography column in accordance with claim 13 wherein said robust monolithic carbon stationary phase is characterized by a skeleton size of 200 nm to 10 μm .
15. A monolithic chromatography column in accordance with claim 14 wherein said robust monolithic carbon stationary phase is characterized by a skeleton size of 400 nm to 1 μm .
16. A monolithic chromatography column in accordance with claim 12 wherein said monolithic carbon stationary phase is characterized by a hierarchical porous structure.
17. A monolithic chromatography column in accordance with claim 16 wherein said hierarchical porous structure comprises macropores and mesopores.
18. A monolithic chromatography column in accordance with claim 17 wherein said macropores are of a size range of 0.05 μm to 100 μm .
19. A monolithic chromatography column in accordance with claim 18 wherein said macropores are of a size range of 0.1 μm to 50 μm .
20. A monolithic chromatography column in accordance with claim 19 wherein said macropores are of a size range of 0.8 μm to 10 μm .
21. A monolithic chromatography column in accordance with claim 17 wherein said mesopores are of a size range of 18 Å to 50 nm.

22. A monolithic chromatography column in accordance with claim 21 wherein said mesopores are of a size range of 0.5 nm to 40 nm.
23. A monolithic chromatography column in accordance with claim 22 wherein said mesopores are of a size range of 5 nm to 30 nm.
24. A monolithic chromatography column in accordance with claim 12 wherein said monolithic carbon stationary phase further comprises graphite.
25. A method of preparing a robust carbon monolith comprising the steps of:
 - a. providing a carbon monolith precursor having a porosity-generating fugitive phase dispersed therein, said fugitive phase comprising mesoparticles and microparticles;
 - b. carbonizing said carbon monolith precursor to form a carbon monolith; and
 - c. removing said fugitive phase from said carbon monolith to form a robust, porous carbon monolith characterized by a skeleton size of at least 100 nm, and a hierarchical pore structure having macropores and mesopores.
26. A method in accordance with claim 25 wherein said carbon monolith precursor further comprises at least one carbonizable polymer.
27. A method in accordance with claim 25 wherein said porosity-generating fugitive further comprises a material that is soluble in a solvent that does not harm said porous carbon monolith.
28. A method in accordance with claim 25 wherein said porosity-generating fugitive further comprises silica.
29. A method in accordance with claim 25 further comprising, after said removing step, an additional step of graphitizing said porous carbon monolith.
30. A method in accordance with claim 25 wherein said carbon monolith is characterized by a skeleton size of 100 nm to 20 μ m.

31. A method in accordance with claim 30 wherein said carbon monolith is characterized by a skeleton size of 200 nm to 10 μm .
32. A method in accordance with claim 31 wherein said carbon monolith is characterized by a skeleton size of 400 nm to 1 μm .
33. A method in accordance with claim 25 wherein said macropores are of a size range of 0.05 μm to 100 μm .
34. A method in accordance with claim 33 wherein said macropores are of a size range of 0.1 μm to 50 μm .
35. A method in accordance with claim 34 wherein said macropores are of a size range of 0.8 μm to 10 μm .
36. A method in accordance with claim 25 wherein said mesopores are of a size range of 18 Å to 50 nm.
37. A method in accordance with claim 36 wherein said mesopores are of a size range of 0.5 nm to 40 nm.
38. A method in accordance with claim 37 wherein said mesopores are of a size range of 5 nm to 30 nm.
39. A method of preparing a robust carbon monolith comprising the steps of:
 - a. providing a carbon monolith precursor having a particulate porosity-generating fugitive phase dispersed therein, said fugitive phase comprising mesoparticles and microparticles; and
 - b. heating said carbon monolith precursor to carbonize said carbon monolith precursor, and to remove said fugitive phase from said carbon monolith, to form a robust, porous carbon monolith characterized by a skeleton size of at least 100 nm, and a hierarchical pore structure having macropores and mesopores.

40. A method in accordance with claim 39 wherein said carbon monolith precursor further comprises at least one carbonizable polymer.
41. A method in accordance with claim 39 wherein said porosity-generating fugitive further comprises a material that is thermally removable at a temperature that does not decompose said porous carbon monolith.
42. A method in accordance with claim 39 wherein said porosity-generating fugitive phase further comprises at least one material selected from the group consisting of surfactants and low-charring polymers.
43. A method in accordance with claim 39 further comprising, after said removing step, an additional step of graphitizing said porous carbon monolith.
44. A method in accordance with claim 39 wherein said carbon monolith is characterized by a skeleton size of 100 nm to 20 μm .
45. A method in accordance with claim 44 wherein said carbon monolith is characterized by a skeleton size of 200 nm to 10 μm .
46. A method in accordance with claim 45 wherein said carbon monolith is characterized by a skeleton size of 400 nm to 1 μm .
47. A method in accordance with claim 39 wherein said macropores are of a size range of 0.05 μm to 100 μm .
48. A method in accordance with claim 47 wherein said macropores are of a size range of 0.1 μm to 50 μm .
49. A method in accordance with claim 48 wherein said macropores are of a size range of 0.8 μm to 10 μm .

50. A method in accordance with claim 39 wherein said mesopores are of a size range of 18 Å to 50 nm.
51. A method in accordance with claim 50 wherein said mesopores are of a size range of 0.5 nm to 40 nm.
52. A method in accordance with claim 51 wherein said mesopores are of a size range of 5 nm to 30 nm.
53. A method of preparing a monolithic chromatography column comprising the steps of:
 - a. providing a carbon monolith precursor having a porosity-generating fugitive phase dispersed therein;
 - b. carbonizing said carbon monolith precursor to form a carbon monolith;
 - c. removing said fugitive phase from said carbon monolith to form a robust, porous carbon monolith characterized by a skeleton size of at least 100 nm, and a hierarchical pore structure having macropores and mesopores; and
 - d. encapsulating said porous carbon monolith to form a chromatographic column.
54. A method in accordance with claim 53 wherein said carbon monolith precursor further comprises at least one carbonizable polymer.
55. A method in accordance with claim 53 wherein said porosity-generating fugitive further comprises a material that is soluble in a solvent that does not harm said porous carbon monolith.
56. A method in accordance with claim 53 wherein said porosity-generating fugitive further comprises silica.
57. A method in accordance with claim 53 further comprising, after said removing step, an additional step of graphitizing said porous carbon monolith.
58. A method in accordance with claim 53 wherein said carbon monolith is characterized by a skeleton size of 100 nm to 20 µm.

59. A method in accordance with claim 58 wherein said carbon monolith is characterized by a skeleton size of 200 nm to 10 μm .
60. A method in accordance with claim 59 wherein said carbon monolith is characterized by a skeleton size of 400 nm to 1 μm .
61. A method in accordance with claim 53 wherein said macropores are of a size range of 0.05 μm to 100 μm .
62. A method in accordance with claim 61 wherein said macropores are of a size range of 0.1 μm to 50 μm .
63. A method in accordance with claim 62 wherein said macropores are of a size range of 0.8 μm to 10 μm .
64. A method in accordance with claim 53 wherein said mesopores are of a size range of 18 \AA to 50 nm.
65. A method in accordance with claim 64 wherein said mesopores are of a size range of 0.5 nm to 40 nm.
66. A method in accordance with claim 65 wherein said mesopores are of a size range of 5 nm to 30 nm.
67. A method of preparing a monolithic chromatography column comprising the steps of:
 - a. providing a carbon monolith precursor having a porosity-generating fugitive phase dispersed therein;
 - b. heating said carbon monolith precursor to carbonize said carbon monolith precursor to form a carbon monolith, and to remove said fugitive phase from said carbon monolith; and
 - c. encapsulating said porous carbon monolith to form a chromatographic column.

68. A method in accordance with claim 67 wherein said heating step further comprises graphitizing said porous carbon monolith.
69. A method in accordance with claim 67 wherein said carbon monolith precursor further comprises at least one carbonizable polymer.
70. A method in accordance with claim 67 wherein said porosity-generating fugitive further comprises a material that is thermally removable at a temperature that does not decompose said porous carbon monolith.
71. A method in accordance with claim 67 wherein said porosity-generating fugitive phase further comprises at least one material selected from the group consisting of surfactants and low-charring polymers.
72. A method in accordance with claim 67 further comprising, after said removing step, an additional step of graphitizing said porous carbon monolith.
73. A method in accordance with claim 67 wherein said carbon monolith is characterized by a skeleton size of 100 nm to 20 μm .
74. A method in accordance with claim 73 wherein said carbon monolith is characterized by a skeleton size of 200 nm to 10 μm .
75. A method in accordance with claim 74 wherein said carbon monolith is characterized by a skeleton size of 400 nm to 1 μm .
76. A method in accordance with claim 67 wherein said macropores are of a size range of 0.05 μm to 100 μm .
77. A method in accordance with claim 76 wherein said macropores are of a size range of 0.1 μm to 50 μm .

78. A method in accordance with claim 77 wherein said macropores are of a size range of 0.8 μm to 10 μm .
79. A method in accordance with claim 67 wherein said mesopores are of a size range of 18 \AA to 50 nm.
80. A method in accordance with claim 79 wherein said mesopores are of a size range of 0.5 nm to 40 nm.
81. A method in accordance with claim 80 wherein said mesopores are of a size range of 5 nm to 30 nm.